AGRO 100 Apt-Chitosan labeled with BODIPY-FL as a novel cancer diagnostic Agent

SetarehTaki[a*], Mehdi Shafiee Ardestani[b]

Authors' Affiliations:
[a]School of Pharmacy International Campus, Tehran University of Medical Sciences International Campus (TUMS-IC), Tehran, Iran;
[b] Department of Radiopharmacy, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran;

Abstract Presenter:
SetarehTaki;PharmD;School of Pharmacy International Campus, Tehran University of Medical Sciences International Campus (TUMS-IC), Tehran, Iran;
E-mail:setareh_taki@yahoo.com

****Correspondence:***
SetarehTaki;PharmD;School of Pharmacy International Campus, Tehran University of Medical Sciences International Campus (TUMS-IC), Tehran, Iran;
E-mail:setareh_taki@yahoo.com

Abstract

Targeted Nano-based imaging methods have been used to precisely diagnose different diseases lately. In this research, chitosan was synthesized and confirmed using Zeta Sizer and AFM. AGRO 100 Aptamer was conjugated on the surface of chitosan nanoparticles and then conjugate labeled with BODIPY-FL. Then, in vitro assays such as XTT and uptake assessment were preformed. Data showed successful synthesis of nanoparticle and conjugate. Cellular uptake in cancer cells was increased and no significant (p value<0.05) cytotoxicity has been found on normal cells. Taking everything into account, the mentioned fluorescent labeled bioconjugate seems to be an appropriate fluorescent diagnostic agent for the future in vivo studies.

Introduction: Recently, many aptamers such as MUC1, A30, AGRO 100,and etc. have been found which work as therapeutic/diagnostic agents through shape complementary with their specific cancerous cell membrane overexpressed receptors. AGRO 100 is now in the second phase of clinical trials of two cancers as a therapeutic agent and it specifically targets nucleolin which is overexpressed on the cancer cells' surface and constrains tumor growth. Nowadays, aptamer based drug delivery/ imaging is being used as a novel pharmaceutical approach in vitro/ in vivo. These aptamers based on their ability to detect cell surface disease specific biomarkers and treat diseases are termed as smart devices in Nano-Theranostics applications.

Methods and Results: In the current project, chitosan was synthesized and confirmed using Zeta Sizer (size, charge and molecular weight) and AFM. Aptamer AGRO 100 (APT AS1411) was conjugated successfully on the surface of chitosan nanoparticles using a covalent bond (carboxyl active groups to amine active groups) using NHS and EDC, then conjugate labeled with BODIPY-FL.

Conclusion: Using AGRO 100 aptamer, chitosan nanoparticles and BODIPY-FL the desired targeted fluorescent diagnostic agent was constructed. Based on the in vitro results, no significant cytotoxicity on HEK-293 has been found. Moreover, bioconjugate had a good cellular uptake on T47D cells. Taking everything into account, the mentioned fluorescent labeled bioconjugate seems to be an appropriate fluorescent diagnostic agent for the future in vivo studies.

Key words:APT^{AS1411}, ChitosanNPs, BODIPY-FL, Fluorescent, Imaging Agent